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## ECONOMIC AND BUDGET ANALYSES

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## 2. ECONOMIC ASSUMPTIONS

This chapter presents the economic assumptions that underlie the Administration's 2023 Budget.<sup>1</sup> It provides an overview of the recent performance of the American economy, presents the Administration's projections for key macroeconomic variables, compares them with forecasts prepared by other prominent institutions, and discusses the unavoidable uncertainty inherent in providing an eleven-year forecast.

This chapter proceeds as follows:

The first section provides an overview of the recent functioning of the U.S. economy, examining the performance of a broad array of key economic indicators.

The second section presents a detailed exposition of the Administration's economic assumptions underlying the 2023 Budget, discussing how key macroeconomic variables are expected to evolve over the years 2022 to 2032.

The third section compares the forecast of the Administration with those of the Congressional Budget Office (CBO), the Federal Open Market Committee of the Federal Reserve, and the Blue Chip panel of professional forecasters.

The fourth section discusses the sensitivity of the Administration's projections of Federal receipts and outlays to alternative paths of macroeconomic variables.

The fifth section considers the errors in past Administrations' forecasts, comparing them with the errors in forecasts produced by the CBO and the Blue Chip panel of professional forecasters.

The sixth section uses information on past accuracy of Administration forecasts to provide understanding and insight into the uncertainty associated with the Administration's current forecast of the budget balance.

### Recent Economic Performance

The President took office in the midst of the COVID-19 pandemic. Even as COVID-19 variants posed health and economic challenges throughout 2021, the President's policies helped power a historic economic and jobs recovery. Thanks in part to the American Rescue Plan and the Administration's vaccination program, more than 70 percent of Americans are fully vaccinated, our economy is growing, and Americans are continuing to get back to work.

Economic growth in 2021 far exceeded expectations. When the President took office, the Blue Chip panel of professional forecasters projected that real GDP growth in 2021 (fourth-quarter-over-fourth-quarter) would be 3.9 percent. Instead, 2021 growth was 5.6 percent. More than 6.5 million jobs were created in 2021, a record for any first

year President. The unemployment rate dropped from 6.4 percent in January 2021 to 3.8 percent as of February 2022—lower than the Congressional Budget Office, in its pre-American Rescue Plan baseline, projected we would reach any time this decade and years earlier than they projected the economy would begin to approach that rate. The pandemic and a surge in consumer spending that was concentrated in certain goods sectors—in combination with supply chains and labor supply that were also impacted by the pandemic and unable to keep up—led to elevated prices. However, as discussed below, inflation is expected to gradually moderate over the course of 2022 and beyond as supply chain issues continue to improve and the composition of demand adjusts, although the further Russian invasion of Ukraine has put additional upward pressure on prices in the near term.

**Labor Markets**—The labor market improved dramatically in 2021. After entering the year at 6.7 percent, the unemployment rate declined throughout 2021 and ended the year at 3.9 percent, falling to 3.8 percent as of February 2022. Likewise, both the median duration of unemployment and the long-term unemployment rate (U1), which measures the percent of the labor force unemployed for 15 weeks or longer, declined dramatically over the course of the year. Other metrics of labor market health, such as the number of workers who identify as marginally attached to the labor force, the number of discouraged workers, and the number of workers working part-time for economic reasons, all exhibited marked improvement during 2021. By December, the number of Americans filing for unemployment reached its lowest level since 1969 – before moving higher during the height of Omicron and then falling again when cases, hospitalizations, and deaths fell.

Despite the large gains in employment, as of February 2022 there remain 2.1 million fewer people employed relative to before the pandemic. The labor force participation rate remains depressed compared to pre-pandemic levels, likely due to a combination of factors. However, the labor force participation rate rose by 0.4 percentage points in 2021, and the prime-age labor force participation rate rose by 0.9 percentage points. Looking ahead, the pace at which Americans rejoin the labor force is currently, and will remain, an important factor in the economic recovery.

**Consumption**—Consumption by private households is the largest component of the country's economy, accounting for over two-thirds of total output. Because of its large share of GDP, consumer spending growth is essential to economic growth in the United States. Real personal consumption expenditures (PCE), which adjusts for inflation, increased throughout 2021.

A prominent feature of the pandemic has been the extent of the economic damage in specific sectors, par-

<sup>1</sup> Economic performance, unless otherwise specified, is discussed in terms of calendar years (January-December). Budget figures are discussed in terms of fiscal years (October-September).

**Table 2-1. ECONOMIC ASSUMPTIONS<sup>1</sup>**  
(Calendar Years, Dollar Amounts in Billions)

	Actual 2020	Projections											
		2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
<b>Gross Domestic Product (GDP)</b>													
Levels, Dollar Amounts in Billions:													
Current Dollars .....	20,894	22,899	24,631	25,853	26,966	28,064	29,200	30,379	31,626	32,957	34,382	35,877	37,437
Real, Chained (2012) Dollars .....	18,385	19,402	20,213	20,786	21,254	21,687	22,120	22,563	23,028	23,526	24,059	24,612	25,178
Chained Price Index (2012=100), Annual Average .....	114	118	122	125	127	130	132	135	138	140	143	146	149
Percent Change, Fourth-Quarter-over-Fourth- Quarter:													
Current Dollars .....	-1.0	10.1	6.3	4.6	4.1	4.0	4.0	4.0	4.1	4.3	4.4	4.3	4.3
Real, Chained (2012) Dollars .....	-2.3	5.1	3.8	2.5	2.1	2.0	2.0	2.0	2.1	2.2	2.3	2.3	2.3
Chained Price Index (2012=100) .....	1.5	4.8	2.4	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Percent Change, Year-over-Year:													
Current Dollars .....	-2.2	9.6	7.6	5.0	4.3	4.1	4.0	4.0	4.1	4.2	4.3	4.3	4.3
Real, Chained (2012) Dollars .....	-3.4	5.5	4.2	2.8	2.2	2.0	2.0	2.0	2.1	2.2	2.3	2.3	2.3
Chained Price Index (2012=100) .....	1.3	3.9	3.3	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
<b>Incomes, Billions of Current Dollars</b>													
Domestic Corporate Profits .....	1,789	2,195	2,314	2,415	2,383	2,311	2,278	2,247	2,256	2,274	2,299	2,312	2,297
Employee Compensation .....	11,572	12,442	13,314	14,034	14,657	15,284	15,943	16,634	17,356	18,141	18,993	19,890	20,829
Wages and Salaries .....	9,444	10,195	10,918	11,493	12,004	12,516	13,055	13,619	14,205	14,848	15,543	16,278	17,054
Nonwage Personal Income .....	5,274	5,498	5,794	6,124	6,512	6,847	7,184	7,530	7,854	8,202	8,575	8,932	9,236
<b>Consumer Price Index (All Urban)<sup>2</sup>:</b>													
Level (1982-1984 = 100), Annual Average .....	258.8	270.9	283.7	290.3	296.9	303.6	310.5	317.5	324.7	332.0	339.6	347.3	355.2
Percent Change, Fourth-Quarter-over-Fourth- Quarter .....	1.2	6.6	2.9	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Percent Change, Year-over-Year .....	1.2	4.6	4.7	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
<b>Unemployment Rate, Civilian, Percent</b>													
Annual Average .....	8.1	5.4	3.9	3.6	3.7	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
Fourth Quarter Level .....	6.7	4.5	3.7	3.6	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
<b>Interest Rates, Percent</b>													
91-Day Treasury Bills .....	0.4	0.0	0.2	0.9	1.6	1.9	2.1	2.2	2.3	2.3	2.3	2.3	2.3
10-Year Treasury Notes .....	0.9	1.5	2.1	2.5	2.7	2.8	3.0	3.1	3.1	3.2	3.2	3.2	3.3

<sup>1</sup> Based on information available as of mid-October 2021

<sup>2</sup> Seasonally Adjusted

ticularly services. Notably, while total real consumer spending remains roughly at pre-pandemic trend, consumer spending on services in December 2021 was still below its pre-pandemic level and trend, though up significantly relative to December 2020. While overall real PCE approximately recovered during 2021 to its pre-pandemic trend, the pandemic-driven decline in services spending, and corresponding increase in goods spending, is one of several factors behind the elevated levels of inflation experienced during 2021. A rebalancing of spending away from goods and towards services could help alleviate inflationary pressure in the goods economy, particularly for durable goods.

**Nonresidential Fixed Investment**—After declining at an annual rate of 5.3 percent in 2020 (year-over-year), real nonresidential fixed investment increased 7.4 percent for 2021. Equipment and intellectual property investment increased 13.0 and 10.2 percent, respectively.

Business structures investment declined for the second consecutive year in 2021, although to a lesser extent than in 2020.

**The Government Sector**—Topline real government expenditures on consumption and investment increased 0.5 percent in 2021 (year-over-year), which includes a 0.9 percent decline in Federal spending offset by a 0.9 percent increase in State and Local spending. Within the Federal spending category, nondefense spending rose 2.8 percent while defense spending decreased 3.7 percent.

### Economic Projections

The Administration's forecast was finalized on November 10, 2021, with the parameters of that forecast close to the consensus prevailing at that date. The forecast informs the 2023 Budget and assumes implementation of the Administration's policy proposals. The

## 2. ECONOMIC ASSUMPTIONS

Administration's projections are reported in Table 2-1 and summarized below. Note that, for 2021, the table reflects the projections finalized in November. However, estimates for 2021 values have since been released and are referenced in-text.

**Real GDP**—The Administration forecast projects a continued economic recovery during 2022. After finishing 2021 with real GDP growth of 5.6 percent (on a fourth-quarter-over-fourth-quarter basis), real GDP is projected to increase 3.8 percent in 2022 and 2.5 percent in 2023. Real GDP growth is then expected to average 2.0 percent between 2024-2028, and 2.3 percent during 2029-2032.

**Unemployment**—The unemployment rate declined to 3.8 percent during February of 2022, a marked improvement from the 6.4 percent rate at the beginning of 2021. Going forward, the unemployment rate is expected to decline further in 2022 and 2023, falling to an annual average of 3.6 percent during 2023. Over the long-run, the unemployment rate is expected to average 3.8 percent per year.

**Interest Rates**—Interest rates are expected to rise over the near-term as the economy continues its post-recession expansion. The 91-day Treasury bill rate is expected to steadily rise from an average of 0.04 percent in 2021 to 0.9 percent through 2023, and then gradually increase to a terminal rate of 2.3 percent. The 10-year rate follows a similar path as it increases from 1.5 percent

in 2021 to 2.5 percent by 2023, reaching 3.3 percent at the end of the budget window, which reflects both the increase in short-term rates and an increase in the term premium for investors committing to holding long-term securities.

**General Inflation**—The Administration's forecast reflects elevated inflation during 2021, which is expected to decline through 2022 before returning to its long-run trend. Specifically, after peaking at 6.7 percent on a fourth-quarter-over-fourth-quarter basis in 2021, the Consumer Price Index for all Urban Consumers (CPI-U) is projected to grow 2.9 percent in 2022 and 2.3 percent in 2023. Note that 2.3 percent is the rate of CPI-U inflation that is consistent with the Federal Open Market Committee's Personal Consumption Expenditures (PCE) inflation target of 2.0 percent.

As with any forecast, there is considerable uncertainty. For instance, after November 10, 2021 when Administration forecasts were finalized, the economy experienced significantly stronger GDP growth in the fourth quarter of 2021 than had been expected. Also, since November 2021, consensus estimates of inflation for 2022 have increased in part due to upward pressures on global energy and food prices resulting from the Russian invasion of Ukraine, though moderation is still expected across the year. Uncertainty and the previous forecasting record are discussed later in this chapter.

**Table 2-2. COMPARISON OF ECONOMIC ASSUMPTIONS IN THE 2022 AND 2023 BUDGETS**

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
<i>(fourth-quarter-over-fourth-quarter percent change)</i>											
<b>Real GDP:</b>											
2022 Budget Assumptions.....	5.2	3.2	2.0	1.8	1.8	1.8	1.8	1.9	1.9	2.0	2.0
2022 MSR Assumptions.....	7.1	3.3	2.2	1.8	1.8	1.9	1.9	2.1	2.2	2.3	2.3
2023 Budget Assumptions.....	5.1	3.8	2.5	2.1	2.0	2.0	2.0	2.1	2.2	2.3	2.3
<b>GDP Price Index:</b>											
2022 Budget Assumptions.....	1.8	1.9	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
2022 MSR Assumptions.....	4.0	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
2023 Budget Assumptions.....	4.8	2.4	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
<b>Consumer Price Index (All-Urban):</b>											
2022 Budget Assumptions.....	2.0	2.1	2.2	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
2022 MSR Assumptions.....	4.8	2.5	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
2023 Budget Assumptions.....	6.6	2.9	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
<i>(calendar year average)</i>											
<b>Civilian Unemployment Rate:</b>											
2022 Budget Assumptions.....	5.5	4.1	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
2022 MSR Assumptions.....	5.5	4.2	3.9	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
2023 Budget Assumptions.....	5.4	3.9	3.6	3.7	3.8	3.8	3.8	3.8	3.8	3.8	3.8
<b>91-Day Treasury Bill Rate:</b>											
2022 Budget Assumptions.....	0.1	0.2	0.4	0.8	1.2	1.4	1.6	1.7	1.8	2.0	2.2
2022 MSR Assumptions.....	0.0	0.1	0.5	1.3	2.1	2.3	2.4	2.4	2.4	2.4	2.4
2023 Budget Assumptions.....	0.0	0.2	0.9	1.6	1.9	2.1	2.2	2.3	2.3	2.3	2.3
<b>10-Year Treasury Note Rate:</b>											
2022 Budget Assumptions.....	1.2	1.4	1.7	2.1	2.4	2.6	2.7	2.8	2.8	2.8	2.8
2022 MSR Assumptions.....	1.6	2.0	2.4	2.6	2.7	2.9	3.0	3.0	3.1	3.2	3.3
2023 Budget Assumptions.....	1.5	2.1	2.5	2.7	2.8	3.0	3.1	3.1	3.2	3.2	3.2

### Comparison with Other Forecasts

This section compares the Administration's forecast with the contemporaneous forecasts from CBO, the Federal Open Market Committee of the Federal Reserve (FOMC), and the Blue Chip panel of professional forecasters. There are important differences that should inform such comparisons.

The most important difference between these forecasts is that they make different assumptions about the implementation of the Administration's proposed policies. As already noted, the Administration's forecast assumes impacts of Administration policies. In contrast, the CBO forecast assumes no changes to current law. It is not clear to what extent FOMC participants and Blue Chip panelists incorporate policy implementation expectations in their respective outlooks. The Blue Chip panel,

in particular, comprises a large number of private-sector forecasters, who have different expectations about the enactment of the Administration's proposed policies and different views about the contribution of those policies to economic growth.

A second difference is that the different forecasts were published on different dates. For example, while the forecast published by the Administration is based on data available as of November 10th, the Blue Chip forecasts are drawn from a survey administered in early October. These were the latest Blue Chip forecasts available at the time the Administration finalized its forecast. In addition, the FOMC projections were released in mid-September and the CBO forecast was published in July.

**Real GDP**—The Administration forecasts average real GDP growth of 2.4 percent (year-over-year) between 2022-2032, similar to the 2.2 percent average for Blue

**Table 2-3. COMPARISON OF ECONOMIC ASSUMPTIONS<sup>1</sup>**

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
<b>Real GDP (Fourth-Quarter-over-Fourth-Quarter):</b>												
2023 Budget (November 2021) .....	5.1	3.8	2.5	2.1	2.0	2.0	2.0	2.1	2.2	2.3	2.3	2.3
Federal Reserve <sup>3</sup> (September 2021) .....	5.9	3.8	2.5	2.0	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
<b>Real GDP (Year-over-Year):</b>												
2023 Budget (November 2021) .....	5.5	4.2	2.8	2.2	2.0	2.0	2.0	2.1	2.2	2.3	2.3	2.3
Blue Chip <sup>2</sup> (October 2021) .....	5.7	4.1	2.5	2.1	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9
CBO (July 2021) .....	6.7	5.0	1.5	1.1	1.3	1.4	1.6	1.6	1.5	1.6	1.7	--
<b>Consumer Price Index (CPI-U) (Fourth-Quarter-over-Fourth-Quarter):</b>												
2023 Budget (November 2021) .....	6.6	2.9	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
CBO (July 2021) .....	3.4	2.3	2.3	2.4	2.4	2.5	2.5	2.4	2.4	2.3	2.3	--
Federal Reserve <sup>3, 4</sup> - September 2021 .....	4.2	2.2	2.2	2.1	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
<b>Consumer Price Index (CPI-U) (Year-over-Year):</b>												
2023 Budget (November 2021) .....	4.6	4.7	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Blue Chip <sup>2</sup> (October 2021) .....	4.3	3.2	2.4	2.3	2.3	2.3	2.2	2.2	2.2	2.2	2.2	2.2
CBO (July 2021) .....	3.3	2.5	2.3	2.4	2.4	2.4	2.5	2.4	2.4	2.3	2.3	--
<b>Unemployment Rate: (annual averages):</b>												
2023 Budget (November 2021) .....	5.4	3.9	3.6	3.7	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
Blue Chip <sup>2</sup> (October 2021) .....	5.6	4.3	3.9	3.9	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
CBO (July 2021) .....	5.5	3.8	3.7	4.0	4.2	4.3	4.3	4.3	4.4	4.5	4.5	--
Federal Reserve <sup>3, 5</sup> (September 2021) .....	4.8	3.8	3.5	3.5	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
<b>Interest Rates:</b>												
<b>91-Day Treasury Bills (discount basis):</b>												
2023 Budget (November 2021) .....	0.0	0.2	0.9	1.6	1.9	2.1	2.2	2.3	2.3	2.3	2.3	2.3
Blue Chip <sup>2</sup> (October 2021) .....	0.1	0.1	0.6	1.1	1.6	1.9	2.0	2.1	2.1	2.1	2.1	2.1
CBO (July 2021) .....	0.0	0.1	0.2	0.5	0.9	1.3	1.6	1.8	2.1	2.3	2.4	--
<b>10-Year Treasury Notes:</b>												
2023 Budget (November 2021) .....	1.5	2.1	2.5	2.7	2.8	3.0	3.1	3.1	3.2	3.2	3.2	3.3
Blue Chip <sup>2</sup> (October 2021) .....	1.4	1.9	2.3	2.5	2.7	2.9	3.0	3.0	3.0	3.0	3.0	3.0
CBO (July 2021) .....	1.6	1.9	2.0	2.3	2.6	2.8	3.0	3.2	3.3	3.4	3.5	--

Sources: Administration; CBO, The Budget and Economic Outlook: 2021 to 2031, July 2021; October 2021 Blue Chip Economic Indicators, Aspen Publishers, Inc.; Federal Reserve Open Market Committee, September 21, 2021

<sup>1</sup> Calendar Year

<sup>2</sup> 2028–2032 are 5 year averages

<sup>3</sup> Median Projection

<sup>4</sup> PCE Inflation

<sup>5</sup> Average rate during 4th quarter



Chip and higher than the 1.8 percent average for CBO. Recall that the Administration's forecast reflects full effects of the Administration's proposed policies, while the CBO is required to assume a continuation of current law in its forecast. The Administration's forecast also projects higher average growth over the budget window (2.2 percent on a fourth-quarter-to-fourth-quarter basis) than the median FOMC forecast (1.9 percent). However, the Administration's forecast equals the FOMC forecast over the near term in 2022 and 2023.

**Unemployment**—The Administration, CBO, Blue Chip, and FOMC all forecast that 2022 unemployment will be lower than 2021 unemployment. During the 2022-2024 period, the Administration forecasts that the unemployment rate will average 3.7 percent, compared with CBO, Blue Chip, and FOMC averages of 3.9, 4.0, and 3.6 percent during that window, respectively. Over the long run, the Administration projects an unemployment rate of 3.8 percent, compared with 4.5 percent for CBO, and 4.0 percent for Blue Chip and the FOMC.

**Interest Rates**—The Administration's 91-day interest rate forecast is broadly consistent with the Blue Chip forecast and, in most years, is moderately higher than the CBO's forecast. The Administration, CBO, and Blue Chip all expect short-term rates to rise meaningfully over the 2022-2027 period, with the Administration forecasting a faster rise over the coming few years than CBO and Blue Chip. For 10-year rates, the Administration forecasts a steady rise to a 3.3 percent terminal rate, compared to CBO and Blue Chip rates of 3.5 and 3.0 percent, respectively.

**General Inflation**—The Administration's forecast for CPI-U inflation (on a fourth-quarter-over-fourth-quarter basis) is broadly consistent with outside forecasters throughout the budget window. The Administration's forecast for 2021 inflation was close to the actual (6.6 percent versus 6.7 percent). The Administration, CBO, Blue Chip, and the FOMC all project that inflation will moderate over the course of 2022 and into 2023. The Administration's projected long-term CPI inflation rate of 2.3 percent equals CBO's long-term projection, is 0.1 percentage point higher than Blue Chip's long-term projection, and is consistent with the FOMC's 2.0 percent target for PCE inflation.

### Sensitivity of the Budget to Economic Assumptions

Federal spending and tax collections are heavily influenced by developments in the economy. Income tax receipts are a function of growth in incomes for households and firms. Spending on social assistance programs may rise when the economy enters a downturn, while increases in nominal spending on Social Security and other programs are dependent on consumer price inflation. A robust set of projections for macroeconomic variables assists in budget planning, but unexpected developments in the economy have ripple effects for Federal spending and receipts. This section seeks to provide an understanding of the magnitude of the effects that unforeseen changes in the economy can have on the budget.

To make these assessments, the Administration relies on a set of heuristics that can predict how certain spending and receipt categories will react to a change in a given subset of macroeconomic variables, holding almost everything else constant. These sensitivity analyses provide a sense of the broad changes one would expect after a given development, but they cannot anticipate how policy makers would react and potentially change course in such an event. For example, if the economy were to suffer an unexpected recession, tax receipts would decline and spending on programs such as unemployment insurance would rise. In such a situation, however, policy makers might enact policies that stimulate the economy, leading to secondary and tertiary changes that are difficult to predict. Another caveat is that it is often unrealistic to suppose that one macroeconomic variable might change while others would remain constant. Most macroeconomic variables interact with each other in complex and subtle ways. These are important considerations to bear in mind when examining Table 2-4.

For real GDP growth and employment:

- The first panel in the table illustrates the effect on the deficit resulting from a one percentage point reduction in real GDP growth, relative to the Administration's forecast, in 2022 that is followed by a subsequent recovery in 2023 and 2024. The unemployment rate is assumed to be half a percentage point higher in 2022 before returning to the baseline level in 2023 and 2024.
- The next panel in the table reports the effect of a reduction of one percentage point in real GDP growth in 2022 that is not subsequently made up by faster growth in 2023 and 2024. Consistent with this output path, the rate of unemployment is assumed to rise by half a percentage point relative to that assumed in the Administration's forecasts.
- The third panel in the table shows the impact of a GDP growth rate that is permanently reduced by one percentage point, while the unemployment rate is not affected. This is the sort of situation that would arise if, for example, the economy was to experience a permanent decline in productivity growth.

For inflation and interest rates:

- The fourth panel in Table 2-4 shows the effect on the budget in the case of a one percentage point higher rate of inflation and a one percentage point higher nominal interest rate in 2022. Both inflation and interest rates return to their assumed levels in 2023. This would result in a permanently higher price level and nominal GDP level over the course of the forecast horizon.
- The fifth panel in the table illustrates the effects on the budget deficit of a one percentage point higher inflation rate and interest rate than projected in every year of the forecast.
- The sixth panel reports the effect on the deficit resulting from an increase in interest rates in every

Table 2-4. SENSITIVITY OF THE BUDGET TO ECONOMIC ASSUMPTIONS

(Fiscal Years; In Billions Of Dollars)

Budget Effect	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	Total of Budget Effects: 2022–2032
<b>Real Growth and Employment:</b>												
<b>Budgetary effects of 1 percentage point lower real GDP growth:</b>												
(1) For calendar year 2022 only, with real GDP recovery in 2023–2032: <sup>1</sup>												
Receipts .....	-17.1	-27.1	-13.8	-2.3	-0.0	-0.0	-0.0	-0.0	-0.1	-0.1	-0.1	-60.7
Outlays .....	14.3	28.3	12.8	2.3	2.3	2.4	2.5	2.5	2.6	2.6	2.7	75.3
Increase in deficit (+) .....	31.4	55.4	26.6	4.6	2.3	2.5	2.5	2.5	2.6	2.7	2.7	136.0
(2) For calendar year 2022 only, with no subsequent recovery: <sup>1</sup>												
Receipts .....	-17.1	-35.9	-41.8	-43.6	-45.7	-47.7	-49.5	-51.4	-53.5	-55.7	-57.9	-499.8
Outlays .....	14.3	34.5	36.3	38.8	41.7	45.3	49.3	53.6	58.0	62.3	67.0	501.0
Increase in deficit (+) .....	31.4	70.4	78.1	82.4	87.3	93.0	98.8	105.0	111.5	117.9	124.9	1,000.8
(3) Sustained during 2022–2032, with no change in unemployment:												
Receipts .....	-17.2	-53.9	-98.4	-146.3	-198.8	-254.8	-313.1	-375.6	-442.8	-514.6	-590.6	-3,006.0
Outlays .....	-0.3	-0.2	0.8	2.7	5.9	9.8	14.0	18.7	24.2	30.6	37.9	144.2
Increase in deficit (+) .....	16.9	53.7	99.3	149.0	204.7	264.6	327.1	394.3	467.0	545.2	628.4	3,150.2
<b>Inflation and Interest Rates:</b>												
<b>Budgetary effects of 1 percentage point higher rate of:</b>												
(4) Inflation and interest rates during calendar year 2022 only:												
Receipts .....	18.5	36.3	38.1	38.2	40.0	41.7	43.2	44.9	46.7	48.6	50.5	446.7
Outlays .....	47.9	75.1	63.1	63.4	62.8	63.9	64.0	63.7	64.1	66.8	68.9	703.6
Increase in deficit (+) .....	29.4	38.8	24.9	25.1	22.8	22.2	20.8	18.8	17.4	18.2	18.4	256.9
(5) Inflation and interest rates, sustained during 2022–2032:												
Receipts .....	18.5	55.9	97.5	141.5	190.2	242.8	298.2	358.4	424.0	495.1	571.2	2,893.2
Outlays .....	47.2	134.3	207.3	286.3	367.1	453.1	549.9	635.9	742.8	851.1	976.7	5,251.6
Increase in deficit (+) .....	28.8	78.4	109.7	144.8	176.9	210.3	251.7	277.4	318.9	356.0	405.5	2,358.4
(6) Interest rates only, sustained during 2022–2032:												
Receipts .....	1.3	3.0	3.8	4.2	4.6	5.0	5.3	5.6	5.9	6.2	6.4	51.3
Outlays .....	31.0	89.3	130.8	169.7	206.3	243.2	278.7	315.4	348.0	383.3	420.2	2,615.9
Increase in deficit (+) .....	29.6	86.2	127.0	165.6	201.7	238.2	273.4	309.7	342.1	377.2	413.9	2,564.5
(7) Inflation only, sustained during 2022–2032:												
Receipts .....	17.1	52.8	93.7	137.1	185.4	237.5	292.6	352.4	417.6	488.3	564.2	2,838.6
Outlays .....	16.2	45.0	76.4	116.7	161.2	210.9	272.6	322.5	397.4	470.9	560.0	2,649.8
Decrease in deficit (–) .....	-0.9	-7.8	-17.2	-20.4	-24.2	-26.7	-19.9	-29.9	-20.2	-17.5	-4.1	-188.8
<b>Interest Cost of Higher Federal Borrowing:</b>												
(8) Outlay effect of \$100 billion increase in borrowing in 2022 .....	0.1	0.7	1.5	2.0	2.3	2.5	2.7	2.8	2.9	3.0	3.1	23.4

<sup>1</sup> The unemployment rate is assumed to be 0.5 percentage point higher per 1 percent shortfall in the level of real GDP.



## 2. ECONOMIC ASSUMPTIONS

year of the forecast, with no accompanying increase in inflation.

- The seventh panel in the table reports the effect on the budget deficit of a one percentage point higher inflation rate than projected in every year of the forecast window, while the interest rate remains as forecast.
- Finally, the table shows the effect on the budget deficit if the Federal Government were to borrow an additional \$100 billion in 2022, while all of the other projections remain constant.
- These simple approximations that inform the sensitivity analysis are symmetric. This means that the effect of, for example, a one percentage point higher rate of growth over the forecast horizon would be of the same magnitude as a one percentage point reduction in growth, though with the opposite sign.

### Forecast Errors for Growth, Inflation, and Interest Rates

As with any forecast, the Administration's projections are projections and are subject to error because they are

based on a set of assumptions about the underlying milieu comprising social, political, and global conditions. It is impossible to foresee every eventuality over a one-year horizon, much less over ten or more years. This section evaluates the historical accuracy of the past Administrations' forecasts for real GDP growth, inflation, and short-term interest rates from 2002 to the present day, especially relative to the accuracy of forecasts produced by the CBO and Blue Chip panel. For this exercise, forecasts produced by all three entities are compared with realized values of these variables.

The results of this exercise are reported in Table 2-5 and contain three different measures of accuracy. The first is the average forecast error. When a forecaster has an average forecast error of zero, it may be said that the forecast has historically been unbiased, in the sense that realized values of the variables have not been systematically above or below the forecasted value. The second is the average absolute value of the forecast error, which offers a sense of the magnitude of errors. Even if the past forecast errors average to zero, the errors may have been of a very large magnitude, with both positive and negative values. Finally, the table reports the square root of the mean of squared forecast error (RMSE). This metric applies a harsher penalty to forecasts exhibiting large er-

**Table 2-5. FORECAST ERRORS, 2002-PRESENT**

	Administration	CBO	Blue Chip
<b>REAL GDP ERRORS</b>			
<b>2-Year Average Annual Real GDP Growth</b>			
Mean Error .....	1.1	0.5	0.7
Mean Absolute Error .....	1.2	0.8	0.8
Root Mean Square Error .....	1.5	1.1	1.2
<b>6-Year Average Annual Real GDP Growth</b>			
Mean Error .....	1.6	1.3	1.1
Mean Absolute Error .....	1.6	1.3	1.1
Root Mean Square Error .....	1.6	1.4	1.3
<b>INFLATION ERRORS</b>			
<b>2-Year Average Annual Change in the Consumer Price Index</b>	Administration	CBO	Blue Chip
Mean Error .....	-0.2	-0.2	0.0
Mean Absolute Error .....	0.6	0.6	0.6
Root Mean Square Error .....	0.7	0.7	0.7
<b>6-Year Average Annual Change in the Consumer Price Index</b>			
Mean Error .....	0.1	0.0	0.3
Mean Absolute Error .....	0.4	0.3	0.4
Root Mean Square Error .....	0.5	0.4	0.5
<b>INTEREST RATE ERRORS</b>			
<b>2-Year Average 91-Day Treasury Bill Rate</b>	Administration	CBO	Blue Chip
Mean Error .....	0.5	0.5	0.7
Mean Absolute Error .....	0.7	0.6	0.8
Root Mean Square Error .....	1.0	1.0	1.2
<b>6-Year Average 91-Day Treasury Bill Rate</b>			
Mean Error .....	2.0	2.1	2.2
Mean Absolute Error .....	2.0	2.1	2.2
Root Mean Square Error .....	2.4	2.3	2.5

**Table 2-6. DIFFERENCES BETWEEN ESTIMATED AND ACTUAL SURPLUSES OR DEFICITS FOR FIVE-YEAR BUDGET ESTIMATES SINCE 1985**

	Current Year Estimate	Budget Year Estimate	Estimate for Budget Year Plus:			
			One Year (BY + 1)	Two Years (BY + 2)	Three Years (BY + 3)	Four Years (BY + 4)
Mean Error .....	-0.5	0.8	1.6	2.2	2.6	2.9
Mean Absolute Error .....	1.5	1.9	2.6	3.2	3.6	3.9
Root Mean Squared Error .....	2.4	3.0	3.7	4.4	4.7	4.8

rors. The table reports these measures of accuracy at both the 2-year and the 6-year horizons, thus evaluating the relative success of different forecasts in the short run and in the medium run.

Past Administrations have forecast 2-year real GDP growth and interest rates that were higher than actually realized, on average, by 1.1 percentage points and 0.5 percentage points, respectively. This is partly due to the assumption that Administration policy proposals contained in the Budget will be enacted, which has not always come to pass. The 2-year average forecast error for inflation is smaller, -0.2 percentage points, and similar to other forecasts.

### Uncertainty and the Deficit Projections

This section assesses the accuracy of past budget forecasts for the deficit or surplus, measured at different time horizons. The results of this exercise are reported in Table 2-6, where the average error, the average absolute error, and the RMSE are reported.

In Table 2-6, a negative number means that the Federal Government ran a larger surplus or a smaller deficit than was expected, while a positive number in the table indicates a smaller surplus or a larger deficit. In the current year in which the budget is published, the Administration has tended to understate the surplus (or, equivalently, overstate the deficit) by an average of 0.5 percent of GDP.

For the budget year, however, the historical pattern has been for the budget to understate the deficit by an average of 0.8 percent of GDP.<sup>2</sup> One possible reason for this is that past Administrations' policy proposals have not all been implemented. The forecast errors tend to grow with the time horizon, which is not surprising given that there is much greater uncertainty in the medium run about both the macroeconomic situation and the specific details of policy enactments.

A probabilistic range of outcomes for the deficit over the budget window can be calculated by building off of the historical forecast errors summarized in Table 2-6. This is accomplished by taking the RMSE of previous forecast errors and assuming that these errors are drawn from a normal distribution. This exercise is undertaken at every forecast horizon from the current year through four years after the budget year. Chart 2-1 displays the projected range of possible deficits. In the chart, the middle line represents the Administration's expected fiscal balance and the 50th percentile outcome. The rest of the lines in the chart may be read in the following fashion. The top line reports the 95th percentile of the distribution of outcomes over 2021 to 2026, meaning that there is a 95 percent probability that the actual balance in those years will be more negative than expressed by the line. Similarly, there is a 95 percent probability that the balance will be more positive than suggested by the bottom line in the chart.

<sup>2</sup> Additionally, the CBO has historically forecasted smaller deficits, on average, than actually materialized.



